SECTION III: RISKS TO SAGE-GROUSE

Sage-grouse in North Dakota are faced with risks that are common across the range of the species in the western United States. The following describes activities that are believed to pose the most serious threats to long term viability of sage-grouse within their current range in North Dakota. It is important to note that the following discussion is meant to analyze risks that are present on the landscape and is not intended to assign culpability or responsibility to any individual, entity or industry. The intention of this discussion is to provide information on risks to the species and to promote instigation of actions that will help mitigate these risks. Specific issues associated with these risks in North Dakota, as well as mitigation measures to help address them, are discussed in Section IV.

LOSS OF HABITAT AND HABITAT EFFECTIVENESS

Habitat can be lost to the species through a number of activities. The extent (acres) of such losses and duration of time before sagebrush returns to the landscape are two of the factors that must be considered when mitigating for such activities. When large, long term losses of sagebrush-grasslands occur due to any circumstance, proximity of remaining habitat becomes much more important to long term viability of sage-grouse populations. Activities and rangeland treatments at levels that reduce the base acreage or effectiveness of those remaining acres of sage steppe become much more significant to the viability of local sage-grouse populations (Braun 1998, Schroeder et al. 2000).

Conversion of Habitat and Rangeland Alterations:

Conversion of native sagebrush stands to cropland or pasture through plowing, mechanical treatment or chemical removal of plants is one of the more common methods such losses occur. Plowing generally results in long term loss of habitat as sagebrush will not recover under continuous cropping. Plowing often takes place on areas having deep soils and little topographical relief, which are also areas favored as wintering sites for sage-grouse. Losses of winter ranges, which usually make up a small portion of yearlong ranges, have been shown to result in long term losses of populations (Swenson et al. 1987).

Mechanical and chemical treatments have been used in the past to remove large blocks of sagebrush in some western states. These two types of treatments can also be used to achieve specific goals on smaller sites where control, removal or enhancement of sagebrush has been determined to be in the best interest of the sagebrush community.

Burning and spraying of sagebrush has been shown to reduce or alter both the understory and canopy cover of treated communities (Connelly et al. 2000, Wambolt et al. 2002). Effects of fire as a treatment vary with the species of sagebrush and size of areas being treated. Sagebrush species that regenerate from seed such as Wyoming big sagebrush can take more than 30 years to recover from a fire (Welch 2005) and can be eliminated if the site treated is too large. Species that re-sprout from crowns and roots, e.g., silver sagebrush, three-tip sagebrush (*A. tripartita*) and some forms of mountain big sagebrush, can re-establish if the fire intensity is not too high.

Timing and scale of herbicide application reduces sagebrush and/or the forb component and could reduce production and survival of grouse through reduced nutritional levels and increased predation. Indirect effects of persistent application of herbicides are an alteration of the composition and diversity of plant species and may be significant enough to affect availability and quality of the insect component. Any significant loss of a food source critical to early survival of chicks also may have a long-term effect on populations (Potts 1986). Available literature on effects of herbicide application on sage-grouse is almost entirely limited to effects of sagebrush reduction or removal.

Industrial Development:

Oil and gas development structures, roads, pipelines, storage facilities as well as mines, electrical generation facilities (wind turbines), transmission lines and other infrastructure associated with industry can decrease the available habitat base and/or effectiveness of habitat (Braun et al. 2002, Lyon and Anderson 2003). Both transmission lines and fences provide perches for raptors and have been found to increase the risk of collision mortalities (Borell 1939, Aldridge 1998). The overall effect of such structures on a population is unknown; however, sage-grouse use of an area has been shown to increase with distance from power lines (Braun 1998).

Roads related to oil and gas development have been associated with a reduction in nesting success, increased disturbance to grouse on leks and during brood rearing (Braun 1998). In Wyoming, sage-grouse hens with successful nests were found to locate their nests further from roads in oil and gas fields than unsuccessful hens (Lyon and Anderson 2003).

In the interior Columbia Basin, increased road density has been found to be related to increased human population, loss of habitat, increased agriculture and increases in invasive plant species (Wisdom et al. 2002).

Grazing:

Sagebrush communities often provide quality grazing opportunities for a variety of wildlife and livestock. Native vegetation associated with sagebrush-grasslands in North Dakota did evolve with grazing by a number of herbivorous species. However grazing does have the ability to alter composition and productivity of any vegetative community and timing, duration and intensity of grazing can and does influence effectiveness of the sagebrush community for sage-grouse. Grazing directly affects plants within sagebrush-grassland habitats and can alter soil and microclimate within the plant community. Similar rates of grazing can have different affects on sage-grouse depending on whether it occurs on nesting, brood rearing or winter ranges.

Beck and Mitchell (2000) identified both positive and negative direct effects of livestock grazing on sage-grouse habitat. Light to moderate grazing by cattle or managed grazing systems can improve both quantity and quality of summer forage, i.e., forbs, for sage-grouse. Heavy to severe grazing reduces habitat quality, which may lead to increased nest predation or nest desertion, and may pre-empt use of a site by grouse altogether. Residual grass cover following grazing is essential to maintaining quality of nesting habitat.

Noxious Weeds and Invasive Plants:

Noxious weeds and the spread of non-native plant species have become widespread across the range of sage-grouse over the last 50 years. Infestations of some invasive species as club moss (*Selaginella densa*, cheatgrass (*Bromus tectorum*), and bluegrass *Poa sp.*) has resulted in reduced densities of native species within sagebrush-grasslands of North Dakota (NRCS file data). The extent to which these undesirable species have affected sage-grouse in North Dakota is unknown but Great Basin states have documented the loss of millions of acres of sagebrush to cheatgrass and subsequent fires. In North Dakota noxious weeds are those that are difficult to control, easily spread, and injurious to public health, crops, livestock, land and other property. Chapter 63.01.1-01 of the North Dakota Century Code states: It shall be the duty of every person in charge of or in possession of land in this state, whether as a landowner, lessee, renter or tenant, under statutory authority or otherwise, to eradicate or to control the spread of noxious weeks on those lands (Anonymous 1998). Noxious weeds currently posing problems in the sage-grouse range in North Dakota are leafy spurge (*Euphorbia esula),* Canada thistle *(Cirsium arvense*), and in certain instances, field bindweed (*Convolvulus arvensis*). A recent invader that needs close monitoring and control is salt cedar (*Tamarix* spp.) (Anonymous 2003).

Introduction and spread of invasive species occurs through several means, the most common being along transportation routes and waterways. Disturbed ground often serves as an initial point for establishment and the level of disturbance is directly proportional to the susceptibility of an area to invasion. Wildlife in general are probably not major endozoochorous vectors of leafy spurge. Grouse and deer could possibly disperse very low numbers of viable leafy spurge seeds, whereas turkeys are not likely vectors (Wald 2003).

Human activities are the most common source for these disturbances. Roads, agriculture, and natural resource development often result in establishment of new weed beds. Natural elements can also play a role in both establishing and spreading of invasive species. Wildfires, floods and prolonged drought can disturb topsoil and cause plant losses over large areas. Burrowing activities of small animals and localized over-use by livestock and/or wild ungulates can also contribute to establishment and consequential spread of invasive weed species. Off road travel by motor vehicles has also been shown to spread weed seeds (Anonymous 2000).

PHYSICAL THREATS TO SAGE-GROUSE

Recreation:

Recreational activities such as viewing of leks, riding off road vehicles (ORV's) and other activities that result in concentrating recreational activities can result in disturbances to leks, nesting and brood rearing areas or winter ranges. Many activities have become more popular with the advent of "four wheelers" that allow more people access to what were formerly felt to be remote areas. These types of activities are expected to increase during the immediate future.

Recreational hunting of sage-grouse has long been a tradition within the western states and provides economic, recreational and cultural benefits. Information gathered from harvested birds provides information on annual productivity of sage-grouse and the influence of weather on productivity. Information from harvested birds also provides insight into numbers of males that will be attending leks in future years. Hunting can contribute to population declines or slower recovery of populations when combined with loss of habitat, poor weather conditions and high predation rates. Hunting seasons need to be based on good biological information and be adaptable to changing conditions. This becomes more important as habitat and populations diminish.

Predation:

Over the tens of thousands of years that sage-grouse have been adapting to the sagebrush steppe in the western United States, predators have been on the scene. The role that predators play in regulating sage-grouse numbers is highly dependent on quantity and quality of habitat available to any given population of birds in conjunction with ongoing weather patterns and availability of a variety of other prey species (Braun 1998).

Habitat degradation can make both nesting and brooding sage-grouse more vulnerable to both avian and mammalian predators. Degradation of the sagebrush canopy and/or understory can increase vulnerability of grouse and nests to the existing predator community, may alter the predator community, or both. Mammalian predator populations in degraded habitats often shift toward species that are smaller and more numerous (red fox, raccoon, striped skunk) and away from species that have evolved with sage-grouse (coyote, badger). Similar shifts in mammalian predator communities can also accompany intensive predator control programs, e.g., red fox numbers can increase when coyote populations are controlled (Montana Sage Grouse Work Group 2004).   Avian predators such as golden eagles have long co-existed with sage-grouse.

Predator control, which is expensive and only effective for a short term, has seldom been recommended for improving populations of prairie grouse (Schroeder and Baydack 2001). Biologically, long term consequences of predator control are poorly understood and under some circumstances may be counterproductive to long term viability of prairie grouse. Many avian predators of sage-grouse are now legally protected and control substances such as 1080 and other poisons have been prohibited. However, if land use changes continue to degrade sagebrush habitats and predators are shown to negatively impact sage-grouse populations, direct predator control actions may assume greater management importance (Nelson 2001).

Disease and Parasites:

Sage-grouse are susceptible to a variety of diseases and host a number of parasites, such as coccidiosis (Schroeder et al. 1999) Wide spread infections or infestations can locally increase sage-grouse mortality, although this is a rare occurrence. WNv has been documented to kill sage-grouse in Wyoming, Alberta, and Montana (Walker et al. 2004). Radio collared sage-grouse from ongoing studies in those states have been closely monitored to determine possible impacts of the virus on sage-grouse. Tests for WNv require samples from birds that have died within 24-48 hours, which is difficult to achieve without intensive monitoring. At this time, the impact of WNv is being monitored but has not been well-quantified.

Weather:

Weather patterns affect sage-grouse through a number of cause and effect relationships. Cold wet weather during hatching can result in loss of chicks to hypothermia; however wet springs often result in increased green-up and an increase in the variety of forbs, and consequently insects, on the sage-steppe thereby increasing chick survival. Hot dry weather during summer concentrates sage-grouse on riparian areas or other green sites such as alfalfa fields. Such concentrations can lead to increased predation and facilitates the spread of diseases as WNv.

Droughts and dry cycles can reduce the abundance and duration of herbaceous understory in sagebrush grasslands to levels that jeopardize sage-grouse survival. Long cold winters with deep snows that cover sagebrush plants on winter ranges can also be a threat to survival as sage-grouse are totally dependent upon sagebrush as food during winter months.

Sage-grouse managers must be aware of both annual and long term fluctuations in weather patterns. Short term fluctuations will help determine annual and near future population status while long term weather patterns have a greater effect on condition of habitats occupied by the population and will play a larger role in determining the long term trend of the population.

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